COMMAND AND CONTROL & INFORMATION TECHNOLOGIES (C2IT)

The Problem

Current and projected Command and Control (C2) systems do not support the future vision, as expressed in *Beyond C2,* nor the seabased C2 requirements of *Expeditionary Maneuver Warfare (EMW)* and *Ship-to-Objective Maneuver (STOM).*

Missing are a number of specific C2/IT capabilities such as the following:

- Wide-band, over-the-horizon (OTH), communications architecture.
- Integrated expeditionary C2 system that is capable of supporting a distributed Common Tactical Picture (CTP) across the entire Marine Air Ground Task Force (MAGTF) afloat and ashore.
- On the Move ground combat element Combat Operations Centers (COC) in support of STOM operations.
- Decision support systems available at all levels to specifically include the infantry battalion.
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- Lightweight, durable, secure tactical communications within the infantry platoon.

Exploring the means to remedy these shortfalls is the goal of the Lab's C2/IT focus effort. At the tactical level, the effort is from the bottom up. At the operational level, the focus is at providing the capabilities for the Marine Corps operating forces to function more effectively in the context of evolving joint operational concepts.

Command and Control Integration (CCI)

The MCWL CCI effort was born out of the Integrated Marine Multi Agent Command and Control (IMMACCS) program, which was based on the work initiated by MCWL and the California Polytechnic State University (Cal Poly) in leading edge, object oriented, intelligent agent C2 software. Combined with the Jet Propulsion Lab's Shared Net, and Space and Naval Warfare Systems Center, San Diego's CCI Translator (CCIT), the CCI system architecture provides the tactical level model for command and control on the battlespace.
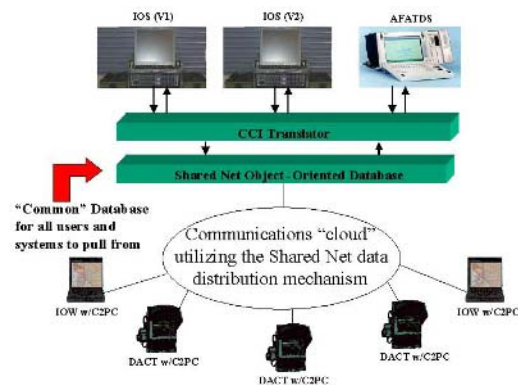
The Lab's Experimental COC design, with the integration of the IMMACCS system, has provided a prototypical operational and tactical level test bed to explore leading-edge technology for future experimentation. With the integration of these efforts and with the acquisition programs of record, the Lab is able to leverage the technology and the experience of operational forces to ensure that the system supports the defined requirement.

The Lab continues its initiative begun in April 2000 to transition CCI to the Marine Corps Systems Command (MARCORSYSCOM) in order to support the integration, data distribution, and data

consistency of the separate MAGTF C4I Software Baseline (MSBL) components. The focus of experimentation during 2002 was to model the legacy data network traffic and scale the CCI system in order to use existing tactical radio assets for data distribution. This included the currently fielded versions of the Single Channel Ground and Airborne Radio System (SINCGARS) and the Enhanced Position Reporting Location System (EPLRS) radios. For 2003, the focus of development is to provide a common database (Shared Net) with a bi-directional translator (CCIT) to existing tactical data systems at the regiment level in order to provide interoperability between those systems and to improve the accuracy and timeliness of the information that populates the Common Tactical Picture (CTP). The desired end state is to develop a capability to synchronize data across legacy systems and perform data distribution down to the platoon level. Targeted time frame for completion of capability and transition to MARCORSYSCOM is September 2003.

As the Warfighting Lab's RSTA projects are being developed, MCWL is working to integrate the messaging and position location information from remote sensor platforms into CCI to improve information for the tactical commander.

In addition, the Lab will continue to explore the use of intelligent agents in various decision support tools to include the ONR funded **Seaways/Loggy** adaptive planning tools that permit near real time collaborative, adaptive planning and production of statements of logistic requirements, offload plans, and logistic support plans for multiple courses of action.

Over-the-Horizon (OTH) Communications

A Lab generated Universal Needs Statement (UNS) for an OTH battalion and below communications capability has been accepted into the Marine Corps Combat Development Command's (MCCDC) Expeditionary Force Development System. The Lab evaluated potential solutions for experimental use during Sea Viking 2004 and is currently developing the
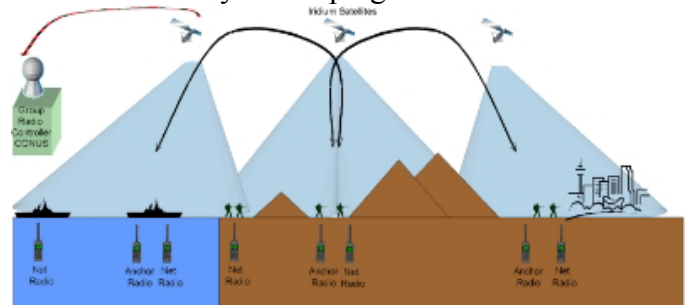

Expeditionary Tactical Communications System (ETCS), which will provide IRIDIUM, netted (one to many) voice and data communications, vice the technology's current point-to-point capability. ETCS will provide 50 Global Net Radios linked to current Marine Corps systems such as the Intelligence Operations Server (IOS) and the Intelligence Operations Workstation (IOW) aboard ship, IOWs at the battalion COC, and the Data Automated Communications Terminal (DACT) at the company level.

The objective end state is to provide a deploying MEU with an experimental capability and produce DOTMLPF recommendations for the OTH communications requirement.

Infantry Company Communications

The Lab has assessed the tactical communications requirement within the infantry rifle company through numerous

Project Metropolis experiments. As a result of this experimentation, the Lab has determined the communications capabilities necessary to support emerging tactics, techniques, and procedures. Specifically, the Lab has explored candidates for a secure platoon tactical radio and a Limited Probability of Intercept/Limited Probability of Detection (LPI/LPD) intra squad radio.
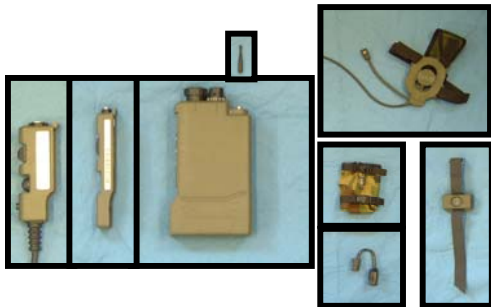

The desired end state is a clear determination of the following:

- What is the best off-the-shelf solution?
- What logistical considerations, such as battery usage/recharging, must be taken into account?
- What are the manning implications? Are more communications specialists required in the infantry battalion?

Digital Combat Operations Center (DCOC)

Current and future operations require that COCs operate on the move using both voice and data while synchronizing maneuver, intelligence, logistics, and fires to create a common tactical picture (CTP). The Lab, in conjunction with
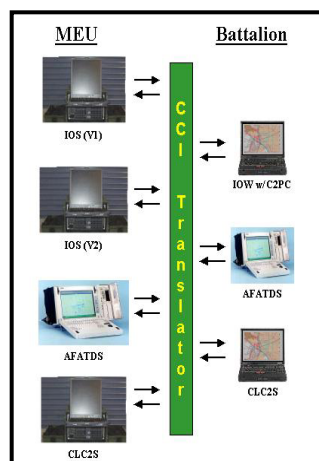
other agencies, is exploring the integration of various digital systems to provide commanders with the capability to operate in an OTH environment while on the move. Current efforts focus on the use of the Lab's Expeditionary Tactical Communications System (ETCS), CCI, and on the move (OTM) capable combat operations centers (COC). Potential OTM COC platforms include a sheltered HMMWV and multiple wireless HMMWVs. The Lab is also examining OTM C2 systems for use by battalion and company commanders during helicopter operations.

Improved Airborne Command and Control Capability (IAC3)

ONR and the Warfighting Lab funded an effort in FY01 to integrate the Army Airborne Command and Control System (A2C2S) into a UH-1 airframe, as a potential replacement for/enhancement to the ASC-26 specialized communications package. The Naval Research Lab was tasked to

construct and provide this improved capability for participation in Kernal Blitz Experimental (KB (X)) 2001. The results of the initial LTA, conducted in the Spring of 2001, determined that the technology was immature and not ready for participation in KB (X). After a fourth LTA, conducted in Nov 2002, the IAC3 was only capable of supporting future Lab experimentation but was deemed not ready to support operational forces.

The Lab and ONR are currently researching alternative solutions using legacy multiband radios. This initiative supports the Marine

Airborne Command and Control Console UNS (Draft) and the Universal Communications Interface Module (UCIM) program of record.

Voice over Internet Protocol

Voice over Internet Protocol or (VoIP) as it is more commonly referred to, provides a method of transporting voice communications over existing data networks. This ability to "converge" our communications networks may allow the deployment of only one communication network where we currently deploy several.

Deploying a "converged" communications infrastructure will allow the Lab to evaluate the benefits of providing cutting edge technologies to field units over existing tactical networks. Improving the quality of communication, both in voice and data format, streamlining the asset requirement to provide those communication paths, and allowing for remote management and control of the network are the areas this effort intends to address.

Testing of VoIP will include configuration and setup, deployment, standardization, measurable Service Level Agreements (SLA's) and evaluation over a variety of data paths.

PRE First In Command and Control System (PRE-FICCS)

The Preliminary First In Command and Control System (Pre-FICCS) is an ONR sponsored system being tested by the Lab.

It provides an air or ground transportable, small footprint, suite of communications and C2 applications appropriate for a forward MAGTF COC. By using the latest in technology and protocols, such as ATM, the Pre-FICCS is quickly able to communicate and collaborate with joint units and reach back to Defense Information System Network (DISN) Teleport locations. At the same time it is able to communicate 'downward' by its ability to integrate such fielded equipment as EPLRS and SINCGARS. The current integrated package uses only components available today, meaning that Pre-FICCS could be employed immediately in support of operational units. However, follow-on technology may quickly be inserted as it becomes available. Being currently developed by Naval Air Warfare Center Aircraft Division (NAWC-AD) with ONR funding, the Pre-FICCS attempts to satisfy an UNS initially sponsored by Marine Force Pacific (MARFORPAC). Based on MARFORPAC's recommendation, Pre-FICCS was incorporated into the live forces portion of MC02. After MC02, Pre-FICCS

was moved to the MCTSSA for maintenance and any further use. In November 2002, IMEF requested the use of Pre-FICCS in support of Operation Enduring Freedom (OEF) and the systems underwent modification and was subsequently sent to Camp Commando in Kuwait.